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Oprema za zimska vzdrževalna dela - Sredstva za odtajanje - 3. del: Druga trdna in tekoča sredstva za odtajanje - Zahteve in preskusne metode

Winter maintenance equipment - De-icing agents - Part 3: Other solid and liquid de-icing agents - Requirements and test methods

Winterdienstausrüstung - Enteisungsmittel - Teil 3: Andere feste und flüssige Enteisungsmittel - Anforderungen und Prüfmethoden

Équipements de viabilité hivernale - Agents de dégivrage - Partie 3: Autres agents de dégivrage solides et liquides - Exigences et méthodes d'essai

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ICS

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Winter maintenance equipment - De-icing agents - Part 3: Other solid and liquid de-icing agents - Requirements and test methods

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This draft Technical Specification is submitted to CEN members for formal vote. It has been drawn up by the Technical Committee CEN/TC 337.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (FprCEN/TS 16811-3:2014) has been prepared by Technical Committee CEN/TC 337 “Road operation equipment and products”, the secretariat of which is held by AFNOR.

This document is currently submitted to the Formal Vote.

Introduction

The specific requirements of de-icing agents for roads, related to the nature of the work to treat and its environment, require the use of products with special properties, which supplement the general properties of use. The variety of products which is used for the winter service operations - liquid or solid, natural or industrial produced substances - requires the defining of performance criteria with which the products have to comply.

These criteria are used to assess the usability of the de-icing products while taking into consideration all aspects of the safety of the road user, of the protection of the environment and of the road conditions.

1 Scope

This Technical Specification defines general specifications and performance criteria of other solid and liquid de-icing agents than chlorides of sodium, calcium and magnesium, hereinafter referred to products, for the use in winter service on roads and on roads for specific uses, with the exception of runways and parking areas of aircrafts. It establishes the test methods to control them. The products include inorganic and organic de-icing agents, and mixtures of chlorides of sodium, calcium, magnesium and potassium with organic and inorganic components which are intended for special properties like inhibition of corrosion, enhanced melting capacity or improved spreading pattern.

NOTE This Technical Specification defines specifications and performance criteria and offers for each a variation in the form of classes of requirements. This does not mean that there are products likely to respond to all the classes and criteria of the standard. Therefore, when defining the demand the user needs to make sure prior the appropriateness of his choice and the availability of suitable products.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15144, *Winter maintenance equipment — Terminology — Terms for winter maintenance*

prEN 16811-1, *Winter service equipment — De-icing agents — Part 1: Sodium chloride — Requirements and test methods*

prEN 16811-2, *Winter maintenance equipment — De-icing agents — Part 2: Calcium chloride and Magnesium chloride — Requirements and test methods*

EN 573-1, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 1: Numerical designation system*

EN 573-2, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 2: Chemical symbol based designation system*

EN 573-3, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 3: Chemical composition and form of products*

EN 573-5, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 5: Codification of standardized wrought products*

EN 932-1, *Test for general properties of aggregates — Part 1: Methods for sampling*

EN 1236, *Fertilizers — Determination of bulk density (loose) (ISO 3944)*

EN 10025 (all parts), *Hot rolled products of structural steels*

EN 13036-1, *Road and airfield surface characteristics — Test methods — Part 1: Measurement of pavement surface macrotexture depth using a volumetric patch technique*

EN 14231, *Natural stone test methods — Determination of the slip resistance by means of the pendulum tester*

EN 1484, *Water analysis — Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)*

EN 27888, *Water quality — Determination of electrical conductivity (ISO 7888)*

EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods (ISO 1461)*

EN ISO 1523, *Determination of flash point - Closed cup equilibrium method (ISO 1523)*

EN ISO 3104, *Petroleum products - Transparent and opaque liquids - Determination of kinematic viscosity and calculation of dynamic viscosity (ISO 3104)*

EN ISO 9377-2, *Water quality - Determination of hydrocarbon oil index - Part 2: Method using solvent extraction and gas chromatography (ISO 9377-2)*

EN ISO 11130, *Corrosion of metals and alloys - Alternate immersion test in salt solution (ISO 11130)*

EN ISO 11885, *Water quality - Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) (ISO 11885)*

ISO 649-2, *Laboratory glassware — Density hydrometers for general purposes — Part 2: Test methods and use*

ISO 565, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

ISO 758, *Liquid chemical products for industrial use — Determination of density at 20 degrees C*

ISO 2479, *Sodium chloride for industrial use — Determination of matter insoluble in water or in acid and preparation of principal solutions for other determinations*

ISO 5815-1, *Water quality — Determination of biochemical oxygen demand after n days (BODn) — Part 1: Dilution and seeding method with allylthiourea addition*

ISO 6060, *Water quality — Determination of the chemical oxygen demand*

ISO 2591-1, *Test sieving — Part 1: Methods using test sieves of woven wire cloth and perforated metal plate*

ISO 12846, *Water quality — Determination of mercury — Method using atomic absorption spectrometry (AAS) with and without enrichment*

ISO 15705, *Water quality — Determination of the chemical oxygen demand index (ST-COD) — Small-scale sealed-tube method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15144 and the following apply.

3.1
de-icing agent
product designed to prevent ice formation and / or to ensure the fusion of ice or snow

Note 1 to entry: It can be in a solid or liquid form. It can be applied pure, diluted, dissolved or mixed. It has a set of physical-chemical properties giving it value for winter service operations (storage, use, efficiency, de-icing performance, level of impact to the road structure, environment and public health).

4 Requirements and test methods

The liquid and solid de-icers shall conform to the following requirements:

4.1 De-icing performance

4.1.1 Nancy-Test

The ability of the product to melt ice at −10 °C is determined, depending on its condition, solid or liquid form, according the test method described in C.1.

This test determines:

— the immediate melting performance (PFI) corresponding to the amount of ice melted by the product after 20 min of contact; and

— the efficient melting performance (PFE), which corresponds to the integration of the relationship between the amount of ice melted by the product and the time, over a period of 60 min.

The minimum requirements for the couple PFI / PFE are:

— PFI ≥ 5,0 ml;

— PFE ≥ 300 ml x min.

These results are obtained on the products marketed before any possible future aqueous dilution or mixing with other solid or liquid products.

4.1.2 Inzell-Test

The ability of the product to melt ice at −2 °C and −10 °C is determined, depending on its condition, solid or liquid form, according the test method described in Annex D.

The test determines the de-icing capacity corresponding to the amount of ice melted by the product after 10 min and 60 min of contact.

4.1.3 Freezing curve

The supplier shall supply the product freezing point as a function of mass percentage (weight %) in aqueous solution. It shall be complemented by the graph (freezing curve) with the freezing data (y-axis is freezing temperature, x-axis is mass percentage).

Additives for liquid and solid de-icers shall be tested with the recommended additive concentration for application in winter service.

The freezing point shall be determined by cryoscopic or spectroscopic methods. The used method shall be documented in the test report.

4.2 Slip resistance

The measurement of the variation of adhesion on a road surface, after application of the product, is performed according to the test method described in C.2.

The variation of the friction coefficient is evaluated using the apparatus described in EN 14231 compared to a water-wet road surface at +5 °C. The measurement with the product shall be performed at +5 °C and −5 °C.

Depending on the type of road or road specific use, the product shall belong to one of the following two classes:

Class	Grip level induced by the product
1	$SRT_1 \geq 0.90\ SRT_e$
2	$SRT_1 \geq 0.75\ SRT_e$

The friction coefficients SRT_i correspond to surface conditions as follows:

— SRT_e in the presence of de-mineralized water;

— SRT_1 in the presence of the product.

4.3 Heavy metals and hydrocarbons

The limits for heavy metals, hydrocarbons, etc. are as follows:

Parameter	Limit mg/l
Aluminium (Al)	≤ 5,00
Arsenic (As)	≤ 0,25
Chromium (Cr)	≤ 0,50
Cadmium (Cd)	≤ 0,20
Copper (Cu)	≤ 0,50
Mercury (Hg)	≤ 0,05
Nickel (Ni)	≤ 0,50
Lead (Pb)	≤ 0,50
Zinc (Zn)	≤ 2,00
Cobalt (Co)	≤ 0,20
Hydrocarbons	≤ 10

NOTE 1 The limits are for an aqueous solution of 100 g product per litre buffered to pH 4.

The content of heavy metals, except for mercury, shall be determined by inductively coupled plasma optical emission spectrometry (ICP-OES), on the basis of the test method in EN ISO 11885.

NOTE 2 Alternatively, the determination of contents of heavy metals can be carried out by atomic absorption spectrometry (AAS), in accordance with the test method in ISO 15586.

The content of mercury shall be determined by cold vapour atomic absorption spectrometry, on the basis of the test method in ISO 12846.

The content of hydrocarbons shall be determined on the basis of the test method EN ISO 9377-2.

4.4 pH

The pH of the product shall be between 5,5 and 11,5.

The pH shall be determined in accordance with the test method in EN ISO 10523 (modified: determination in a 10 weight % aqueous solution; dissolving and dilution with distilled water).